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Claims

I claim:

1. A tube support structure for use within an array of heat exchanger tubes, each tube having a diameter and a longitudinal axis, the tube support structure comprising:

a tube support bar for use between a pair of heat exchanger tubes, the support bar comprised of a first metallic strip attached to a second metallic strip at spaced intervals, the first strip having a coefficient of thermal expansion greater than the second strip.

2. The tube support structure of Claim 1, wherein the first and second strips are flat at a first temperature, and wherein the first strip becomes convex at a temperature higher than the first temperature.

3. The tube support structure of Claim 1, wherein the first strip is thinner than the second strip.

4. The tube support structure of Claim 3, wherein the first strip is 0.02 inches thick and the second strip is 0.08 inches thick.

5. The tube support structure of Claim 1, wherein the first strip is attached to the second strip via spot welding.

6. The tube support structure of Claim 1, wherein the first strip is attached to the second strip at spaced intervals in a direction transverse to the length of the second strip.

7. The tube support structure of Claim 6, wherein the first strip is attached to the second strip at spaced intervals of about 2 tube diameters.

8. The tube support structure of Claim 7, wherein the tube diameter is about 0.5 inches and the first strip is attached to the second strip at spaced intervals of about 1 inch.

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9. The tube support structure of Claim 1, wherein the first strip is made of SB-166 I690 and the second strip is made of SA 240 type 410S.

10. The tube support structure of Claim 1, wherein the second temperature is about 550 degrees F.

11. The tube support structure of Claim 1, wherein the tube support bar is a low-bar of a lattice tube support bar array.

12. The tube support structure of Claim 1, wherein the tube support bar is a high-bar of a lattice tube support bar array.

13. The tube support structure of Claim 1, further comprising a third metallic strip attached to the second metallic strip opposite the first metallic strip at spaced intervals, the third strip having a coefficient of thermal expansion greater than the second strip.

14. A support for heat transfer tubes in a steam generator, the support comprising:

a plurality of bars installed between the heat transfer tubes so that a gap exists between the bars and the heat transfer tubes;

a spring means welded to at least one of the bars at intervals, the spring means having a thinner thickness than the bar; and

wherein the spring means and the bar have different thermal expansion coefficients so that at a non-operating temperature of the steam generator the spring means does not contact the adjacent tube and at the operating temperature of the steam generator the spring means contacts the adjacent heat transfer tube.

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15. A method for making a tube support bar for supporting heat transfer tubes in a steam generator, the tubes having a tube diameter, the method comprising the steps of:

welding a first metal layer to a second metal layer at intervals to form a support bar, the first metal layer and second metal layer having different thermal expansion coefficients so that at a non-operating temperature of the steam generator the bar is flat, and at the operating temperature of the steam generator the first layer forms a convex shape between the intervals; and

installing the tube support bar in the steam generator.

16. The method of Claim 15, wherein the first metal layer has a smaller thickness than the second metal layer.

17. The method of Claim 15, wherein the space between the intervals is approximately equal to the diameter of two heat transfer tubes.

18. The method of Claim 15, wherein the first metal layer is made of SB-166 I690 and the second metal layer is made of SA 240 type 410S.

19. The method of Claim 15, wherein the operating temperature is about 550 degrees F.